

**WHAT IS CLAIMED IS:**

- 2           1.     A microfluidic device for assaying a liquid biological sample of 20 $\mu$ L or  
less comprising:
  - 4           (a)     an inlet port for receiving said sample;
  - (b)     a capillary passageway in fluid communication with said inlet port;
  - 6           (c)     an inlet chamber in fluid communication with the capillary passageway of  
(b), thereby permitting said sample to flow into said inlet chamber, said inlet chamber  
8 containing means for uniformly distributing said sample across said chamber and,  
displacing air from said chamber; and
  - 10          (d)     at least one vent passageway for removing air displaced by said liquid  
sample.
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2.     A microfluidic device of Claim 1 wherein said means for uniformly  
14 distributing said sample is at least one groove extending across said inlet chamber.
- 16          3.     A microfluidic device of Claim 1 wherein said means for uniformly  
distributing said sample is at least one weir extending across said inlet chamber.
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4.     A microfluidic device of Claim 2 or 3 wherein said at least one groove or  
20 at least one weir contains wedge-shaped cutouts to facilitate uniform flow of said  
sample.
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5.     A microfluidic device of Claim 1 wherein said means for uniformly  
24 distributing said sample is a microstructure comprising an array of posts disposed across  
said inlet chamber.
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6.     A microfluidic device of Claim 5 wherein said posts contain wedge-  
28 shaped cutouts to facilitate uniform flow of said sample.
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engage the corresponding shape of a pipette for depositing said sample
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8.     A microfluidic device of Claim 1 further comprising an blood anti-  
34 coagulant deposited in said inlet chamber.

2           9.       A microfluidic device of Claim 1 further comprising an overflow chamber  
in fluid communication with said inlet chamber, said overflow chamber for receiving  
4       said sample in excess of the amount needed to fill said inlet chamber.

6           10.       A microfluidic device of Claim 9 wherein said overflow chamber contains  
an indicator to detect the presence of excess of said sample.

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          11.       A method of supplying liquid to a microfluidic device having an inlet port  
10       in fluid communication with an inlet chamber via a capillary passageway, said method  
comprising.

12           (a)       introducing a portion of said liquid into said inlet port;  
             (b)       transferring by positive pressure or capillary forces said liquid portion of  
14       (a) to said inlet chamber via said capillary passageway;  
             (c)       distributing said liquid portion of (a) uniformly across said inlet chamber  
16       and purging air from said chamber completely.

18           12.       A method of Claim 11 wherein excess of said sample is diverted to an  
overflow chamber after said inlet chamber is filled.

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          13.       A method of Claim 12 wherein the presence of said excess is detected by  
22       an indicator in said overflow chamber.